



**US Army Corps
of Engineers**
Jacksonville District

Final Superfund Five-Year Review Report

BMI -TEXTRON

Lake Park, Palm Beach County, Florida

Prepared for
U.S. Environmental Protection Agency, Region IV
June 2000

EPA Five-Year Review Signature Cover

Preliminary Information

Site name: BMI TEXTRON		EPA ID: FLD052172954
Region: 04	State: Florida	City/County: Palm Beach
LTRA* (highlight): Y N		Construction Completion Date: 11/30/95
Fund/PRP Lead: PRP		NPL Status: Final
Lead Agency: EPA, Region 4		
Who conducted the review (EPA Region, state, Federal agencies or contractor): US Army Corps of Engineers, Jacksonville District		
Dates review conducted: From: 4/10/00 To: 6/1/00		Date(s) of site visit: 4/26/2000
Whether first or successive review: First Review		
Circle: Statutory Policy		Due date: 8/11/99
Trigger for this review (name and date): Initiation of RA Activities		
Recycling, reuse, redevelopment site (highlight): Y N		

Deficiencies:

A list of deficiencies were identified. See attached report Section VII: Deficiencies.


Recommendations:

Recommendations are listed in the attached report, Section VIII: Recommendations.

Protectiveness Statement(s):

The remedies at the BMI-Extron remain protective of human health and the environment, at present.

Signature of EPA Regional Administrator or Division Director, and Date



25 AUG '00

Signature

Date

RICHARD D. GREEN
DIRECTOR, WASTE MGT. DIVISION

Name and Title

BMI- TEXTRON
Lake Park, Palm Beach County, Florida
Superfund Five-Year Review Report

Table of Contents

I. Introduction and Purpose	1
II. Site Background	2
III. Results of Site Investigations	7
IV. Summary of Response Actions	11
V. Summary of Site Visit and Findings	14
VI. Assessment	19
VII. Deficiencies	20
VIII. Recommendations	21
IX. Protectiveness Statement	21
X. Next Review	21

Figures:

- Figure 1: Site Location Map
- Figure 2: Geologic Cross Section of the Sandy Ridge Aquifer
- Figure 3: Site Plan with Upper Surficial Aquifer Monitoring Wells
- Figure 4: Upper Surficial Aquifer GW-Level elevations, January 1998

Tables:

- Table 1: Chronology of Site Events
- Table 2: Performance Standards

Photographs:

Attachments:

- Attachment A - Documents Reviewed
- Attachment B - GW Summary of Sodium Concentrations
- Attachment C - GW Summary of Total/ Amenable Cyanide Concentrations
- Attachment D - GW Summary of Fluoride Concentrations
- Attachment E - GW Summary of Arsenic Concentrations
- Attachment F - EPA Request to FDEP for Concurrence on Partial Delistment
- Attachment G- Five-Year Review Checklist

Table of Contents (continued)

Attachment G- Five Year Review Checklist

BMI-TEXTRON
Lake Park, Palm Beach County, Florida
Superfund Five-Year Review Report

I. Introduction and Purpose

General.

The U.S. Army Corps of Engineers, Jacksonville District (USACE), on behalf of the U.S. Environmental Protection Agency, Region 4 (EPA), has conducted a five-year review of the remedial actions implemented at the BMI-TEXTRON (BMIT) site, Lake Park, Palm Beach County, Florida. This report documents the results of that review. The purpose of five-year reviews is to determine whether the remedial actions at a site remain protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and recommendations to address them.

Authority.

Although not required by statute, this review is being conducted in accordance with EPA Policy. EPA conducts Five-Year Reviews as a matter of policy at: (1) sites where no hazardous substances will remain above levels that allow unlimited use and unrestricted exposure after completion of remedial actions, but the cleanup levels specified in the Record of Decision (ROD) will require five more years to obtain; (2) sites addressed before SARA at which the remedy, upon attainment of cleanup levels, does/will not allow unlimited use and unrestricted exposure; and (3) removal-only sites where hazardous substances remain onsite at levels that will not allow unlimited use and unrestricted exposure. This site has been reviewed because the cleanup levels have required more than five years to obtain.

This is the first five-year review for the BMIT. The trigger for this policy review is the signing of the preliminary closeout report on August 11, 1994.

Local Repository.

A copy of this 5- Year Review Report will be placed in the EPA Region IV Record Center in Atlanta, GA, as well as the local information repository for the BMIT site. The Information repository is:

Lake Park Library
529 Park Avenue
Lake Park, FL 30403
(407) 848-6070

II. Site Background

The following text is borrowed in large part, with modifications and additions, from the EPA Record of Decision (ROD) documents and other reports as listed in Attachment A: Documents Reviewed. It is not the purpose of this report to present a detailed description of the site background, since this has already been done in previous reports, which can be found in the local repository.

A. Site Description

Location

The BMI-TEXTRON (BMIT) site is located at 1211 Silver Beach Road in the Tri-City Industrial Park, Lake Park, Florida. The BMIT is an inactive 3.5 acre industrial site. The present boundaries include:

- north- Newman Road
- south- Silver Beach Road
- east- Reed Road
- west- Miller Way

At present, adjacent properties include:

- north- Trans Circuits(formerly)
- south- residential areas
- east- Tri-City lumber
- west- automotive junkyard, repair shops, warehouses, industrial facilities

A site location map is presented as Figure 1.

Site layout

Prior to BMIT operations the surrounding land was cleared and undeveloped, as viewed in a 1965 photograph included in the **Feasibility Study (FS)** report. The present site includes storage warehouses and small workshops. Most of the land is either paved or covered with buildings. There is a locked chain link fence around the property. During BMIT operations the site included:

- 6 domestic waste drainfields
- 3 percolation ponds
- 2 septic tanks
- settling basins

A Site Layout Map is presented as Figure 3.

Topography

BMIT is located on the crest of a hill in the Atlantic Coastal Plain Physiographic Province of Florida. The topography of the site is flat with elevations ranging from 25 to 30 feet National Geodetic Vertical Datum (NGVD).

Drainage and Surface Water

According to the **Remedial Investigation (RI)**, the BMIT is located in an industrialized area of Palm Beach County, where there are no surface water bodies or wetlands on or in close proximity to the site. Runoff that occurs on-site drains into shallow drainage swales located along the site perimeter and then out into the surrounding streets. From here the storm-water flows along the roads in swales to the south until it evaporates. Therefore, no direct flow route from BMIT to perennial surface water exists. The nearest surface water body is the Earman River, which is one mile north of BMIT.

Site Geology and Hydrogeology

The geologic setting of the BMIT site is described in detail in the Record Of Decision(ROD) Final Feasibility (FS) Study (G&M) and the Final Remedial Investigation / Feasibility Study (RI/FS) Work Plan(G&M). A geologic cross-section, along with the four hydrogeologic systems underlying the site is presented in Figure 2.

Surficial Aquifer System:

The Sandy Ridge Shallow Ground Water Aquifer System is divided into four units:

- Unit 1: Composition: sand and shell layers: Thickness: twenty to forty feet
- Unit 2: Composition: unconsolidated sand and shell: Thickness: sixty feet
- Unit 3: Composition: very fine sand and shell: Thickness: 50 feet
- Unit 4: Composition: firmly cemented sand and shell: Thickness: 100 feet

Unit four is the thickest and most permeable of all the aquifer units in the area. It is where most of the drinking water supply wells are located. The hydraulic properties of unit four are:

- transmissivity = 4,000 ft² / day
- storage coefficient = 1×10^{-4}
- average hydraulic gradient = 0.0004 ft/ft
- porosity = 0.30
- average hydraulic conductivity = 40 ft/day
- average horizontal groundwater velocity = 0.05 ft/day

The hydraulic properties of the entire Sandy Ridge Aquifer at the site are:

- hydraulic conductivity = between 1 and 50 ft/day
- transmissivity = 7,000 ft²/day
- average hydraulic gradient = .0004
- general groundwater flow is to the north- northeast

According to the ROD, the Sandy Ridge Aquifer is underlain by approximately 250 to 350 feet of green, shelly clay representing the Hawthorn Group. This impermeable unit represents the main confining unit between the shallow Aquifer and the deep **Floridan Aquifer**. In the BMIT area the Floridan Aquifer is approximately 1,000 feet below the land surface. The Floridan Aquifer is considered an unsuitable water source for the area because of its brackish water properties.

BMIT is underlain by unconsolidated, fine to medium grained sands of the **Paola series**, to a depth of approximately fifty-five feet below ground surface (bgs). Soil borings from previous site investigations revealed a one-inch hardpan layer of iron rich cemented sand at depths of eleven feet. Borings also revealed a lense of organic material at depths of nine to seventeen feet. This organic layer is believed to reflect a change in sediment source and depositional environment.

The depth to GW at the site ranges between fifteen to twenty feet bgs. The **RI** reported that little or no differences in water level elevations occur between the upper and lower surficial aquifer zones. Therefore, there is a lack of vertical groundwater flow at BMIT site to spread contaminants between Aquifer levels. Based on a review of numerous documents, fluctuations in GW levels at BMIT are directly related to seasonal and high capacity local well withdrawals. During the wet season (June-September) the shallow aquifer is replenished mostly by local rainfall. The greatest loss of water occurs during the dry season (November- May) when evapotranspiration rates are high. Municipal wells located in the area, have reported water table fluctational differences as much as ten feet between the wet and dry season.

Local wells in the area include:

- City of Riviera Beach Municipal Supply Well # 16:
Location = 3,000 feet southeast of BMIT
Hydraulically upgradient
- Trans Circuits Recovery Well System
Location = 300 feet north of BMIT
Hydraulically slightly downgradient

Besides affecting GW fluctuations, the wells have also been documented to influence site GW flow directions to the southeast (Riviera) and to the north (Trans). There are no other downgradient wells in the area.

B. Site Chronology

History of Operations.

Basic Microelectronics, Inc. (BMI) began substrate operations at the BMIT site in October, 1969. Textron Inc. acquired BMI in January, 1981 and began operations as BMI-Textron (BMIT). The company's main product was chrome backed glass plates that were used by BMIT's customers in the manufacture of electronic components. In the manufacturing process used by BMIT the plant processes included:

- receiving glass
- cutting glass to size
- mechanically polishing glass
- washing glass
- rinsing glass
- depositing chrome on glass
- applying photoresist solution
- baking finished glass
- packing product for shipping

Materials and chemicals used in the operations included:

- cerium oxide
- ceric ammonium nitrate
- chromium
- acetone
- potassium ferrocyanide
- possibly fluoride

Liquid wastes generated during manufacturing operations were disposed of on site through a system of percolation ponds and drainfields. The wastewater system was operated under a Florida Department of Environmental Regulation (FDER) permit. BMIT disposed of cyanide wastes in Percolation Pond 1, prior to the ponds abandonment in August, 1984. Hazardous wastes from facility operations were disposed off-site, at approved facilities.

In April 1981, BMIT received a FDER construction permit for the installation of an additional drainfield to dispose of wastewater from a Reverse Osmosis plant. As a requirement of the permit, four monitoring wells were installed on the property to monitor permit compliance. BMIT was also required to submit a monthly report of sampling results, which would later start the chain of events leading to enforcement actions.

According to the **RI**, with the addition of the reverse osmosis purification plant, BMIT generated wastewater included:

- Wastewater from chromium stripping operations
- Process wastewater from glass cleaning, coating, polishing, and rinse waters
- Wastewater from a reverse osmosis water purification plant
- Domestic sanitary wastewater

Enforcement and Compliance

The first enforcement action on the BMIT appears to be a Notice of Violations (NOV) received from the Florida Department of Health and Rehabilitation (FDHR). The problem originated from monthly report sampling data, which showed exceedances of permit standards for nitrate, total dissolved solids and pH. During the time period between 1984 and 1990 the following regulatory measures occurred.

- **FDEP, 1983-1984** (1) performed a soil and groundwater assessment, (2) issued a consent order to remove cyanide contaminated soils from percolation pond one.
- **EPA Region IV, 1987** conducted it's initial investigation at the BMIT site. The investigation was performed to determine if BMIT would be placed on NPL list.
- **FDEP, 1988** issued an additional consent order to: remove contaminated soil from percolation pond two, install an impervious surface cap over percolation pond three, and implement a groundwater monitoring plan.

In August 1990, the site was listed on the National Priorities List (NPL). In June 1992, BMIT entered into an **Administrative Order (AO)** by consent with the EPA to conduct a RI/FS. The RI/FS was conducted between February 1993 and August, 1994. On August 11, 1994 the ROD was issued identifying Alternative 2 from the FS as the recommended remedy. BMIT and EPA entered into a **Unilateral Administrative Order (UAO)** in October 1994, to implement the selected remedy. Subsequently, the Remedial Design (RD) was completed on March 24, 1995. The Remedial Action for BMIT was performed during March 1995 through November 1995. Presently the remedial action (RA) appears to have been successful for BMIT, because the site is close to deletion from the NPL.

The chronology of the major actions at the BMIT site are summarized in Table 1. The results of site investigations are presented in the next section.

III. Results of Site Investigations

A. General

Pre-NPL Listing (1990)

The results of site investigations conducted prior to NPL listing in August 1990 are summarized in the Final Feasibility Report, dated April 1994, and in the ROD, signed on August 11, 1994. In summary, these early investigations included and resulted in the following:

- In 1984 a GW and soil assessment of the area of Percolation Pond 1 revealed that cyanide contamination existed at the site. This resulted in a consent order with FDER. Percolation Pond 1 was subsequently abandoned and contaminated soils were removed from the area.
- In 1985-86 a GW and soil assessment of the site revealed that cyanide, nitrate and fluoride contamination existed in the area of Percolation Pond 2. This data would later be used for consent order two.
- In 1986 a soil assessment of the area of Percolation Pond 3 and the Reverse Osmosis (RO) Drainfield revealed cyanide, fluoride and nitrate contamination.
- In 1987 a GW and soil investigation revealed barium, chromium and cyanide contamination existed at the site. This resulted in a hazard ranking score of 37.93 based on the Groundwater Route Score.
- In 1988 under Consent Order Two with FDER, a soil investigation was performed at the site revealing cyanide, fluoride, and nitrate and chromium contamination in the area of Percolation Pond 2. The sampling results were later used to support the corrective action for the removal of contaminated soils from the area. The consent order also directed BMIT to continue monthly GW monitoring and to submit quarterly reports.

NPL Listing (1990) to ROD Signing (1994)

In 1990 an **Interim Remedial Action Soil Disposal Plan** was submitted to the FDER and approved for the removal and disposal of soils from Percolation Pond 2. The work began and was completed in April. Soil sampling results from previous investigations of Percolation Pond 3 revealed contaminant levels below FDER standards. As part of the plan the area was backfilled with four feet of material and

capped with asphalt.

Geraghty and Miller, Inc. (G&M) conducted a RI of the site in two separate phases between February and August 1993. The primary objectives of the RI were to determine the nature and extent of contamination at the site and to satisfy statutory requirements under the EPA I BMIT UAO. A Baseline Risk Assessment was also completed during the RI. The RI was conducted in two phases:

Phase 1 was conducted between February and May 1993. The investigations included:

- Soil and GW sampling
- Elevation surveys of MW casings
- Potable well survey of all residences within a 1,000 ft. radius
- Human Population Survey
- Ecological Assessment

Phase 2 was completed as a RI addendum between June and August 1993. After reviewing data from the RI, EPA determined that further GW assessment was needed. The additional investigations included:

- Additional GW well development, installation and sampling.
- Additional round of water level measurements for all wells.

The RI results from both phases can be summarized as follows:

- GW was identified as the principal media of concern at the site;
- The GW at BMIT is contaminated with elevated levels of arsenic, sodium, cyanide and fluoride, the **Contaminants of Concern (COC)**;
- The GW contamination was present only in the shallow aquifer in the northeast portion of the site;
- Offsite migration of contaminated groundwater had not occurred;
- There are no private water wells near the site;
- Surface water bodies were not impacted, therefore sediment and surface water were not medias of concern;
- Air contamination is not a concern because the site is mostly paved and the contaminants of concern were not present in surface soils;
- Impacts to local plants and animals were not expected because of the industrial nature of the site;

In April 1994, G&M completed a **Feasibility Study(FS)** which included an evaluation of

proposed remedial alternatives for GW remediation and proposed cleanup levels for the contaminants of concern. In summary, the important points in the FS concluded that:

- Previous soil excavations at Percolation Ponds 1 and 3, were effective in remediating contaminated soils from the areas;
- The remaining soils at the site do not pose a threat to GW quality;
- GW contamination was restricted to the upper surficial aquifer zone of Percolation Ponds 1 and 2, indicating a lack of vertical migration of the COC's and a lack of connectivity between the upper and intermediate layers of the Aquifer;
- Arsenic, sodium, cyanide and fluoride were detected in GW, at concentrations above the state of Florida's drinking water standards, thereby requiring remedial action;
- Potential cleanup criteria for GW Contaminants of Concern were established.

The FS compared four remedial alternatives for groundwater along with available technologies and appropriate regulations for each. The remedial alternatives evaluated in the study were (1) No action, (2) Institutional Controls and monitoring, (3) Institutional Controls, Monitoring, Recovery, On- Site treatment, and Off-Site Discharge, and (4) Institutional Controls, Monitoring, On-Site Recovery, Treatment, and Discharge. The results of the FS were used by the EPA to determine the preferred remedial alternative which would latter be implemented as the remedial action for the site.

This concludes the summary of site investigations at BMIT before the signing of the ROD on August 11, 1984.

B. Contaminants of Concern

The following constituents (see Table 2 of the ROD) were identified as contaminants of concern (COC) for the ROD based on RI sampling. The COC's were reported at levels above Federal and State Maximum Containment Levels (MCLs). The source of the contaminants as identified in the ROD, were wastes produced by BMIT during the manufacturing process.

Groundwater COC's

- Arsenic
- Sodium
- Cyanide
- Fluoride

During phase 1 of the RI, arsenic levels in groundwater had exceeded the Federal and State MCLs. However in the second phase, arsenic was found at concentration levels below federal and state MCLS.

Factors used in the RI and ROD for the selection of the Contaminants of Potential Concern (COPC's) were:

- Frequency of detection
- Fate and transport
- Concentration
- Toxicity

C. Potential Pathways for Contaminant Migration and Exposure

According to the ROD the primary source of contamination at the BMIT was the wastewater/ sludge in Percolation Ponds 1 and 2. RI sampling data showed that the two previous remedial actions that removed the soils in both areas, thereby removed the contaminant source. RI data also proved that the remaining soils would not impact groundwater quality onsite. However, because past releases of the COCs had impacted the groundwater quality at the site, the potential pathway of exposure was identified in the ROD as:

- Release of leachate into groundwater.

Therefore, the only possible medium available for human contact with COC's on and offsite is groundwater.

Summary of Site Risks

Human Risks

The RI determined that potable wells near the BMIT and downgradient areas were not contaminated from BMIT operations. There was also no knowledge of consumption of contaminated groundwater from the Aquifer in or near, the vicinity of BMIT. The ROD considered that this, along with the previous soil remedial actions, had left no current exposure routes open from any media to humans. Therefore, the ROD determined that there is no risk to human health based on the current use of the site.

A future hypothetical worst-case exposure scenario for the GW media was considered in the risk assessment. The possibility of installing new potable wells into the contaminated groundwater that would be utilized by workers or new residents was used. As a result, based on exposure levels quantified in the toxicity assessment, the EPA determined that the cumulative, carcinogenic and non-carcinogenic risks associated with use of the contaminated groundwater as a potable water source by future residents were unacceptable. The EPA used the following criteria in the risk

assessment.

Cancer slope factors (CSF'S), associated with exposure to potentially carcinogenic chemicals through specific media have been calculated and reported in the ROD. The toxicity criteria used in the ROD to evaluate potential non-carcinogenic health effects through specific media are reference doses (RfDs). Both the CSFS and RfDs values can be found in the ROD in Table 3. Hazard quotients (HQs) associated with exposure to a single non-carcinogenic contaminant in GW medium have been calculated and used in the ROD to determine HI values. Hazard indexes (HI's) have been generated by totaling the HQ's for each medium, and are useful for gauging the potential significance of multiple contaminant exposures. HI's are reported in Table 4 of the ROD.

Environmental Risks

The conclusions of the ecological survey report conducted for the BMIT RI / FS, were summarized in the ROD ecological assessment. The ecological survey report concluded that because the area was mostly developed and surrounded by a chain link fence:

- Plant growth is scarce
- Animal niches are scarce
- Protective cover for feeding and nesting sites are virtually absent
- BMIT operations had not visually caused adverse damage to the local Biota.

Furthermore, the removal of the contaminant source closed all pathways that could have potentially resulted in ecological damages.

IV. Summary of Response Actions

A. Remedial Objectives

The objectives of the recommended remedy for groundwater at the BMIT site as stated in the ROD were:

- Protection of human health and the environment;
- Compliance with Applicable, or Relevant, and Appropriate Requirements (ARARs);
- Utilize technologies which offer long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volume through treatment;
- Short term effectiveness:
- Implementability;
- Provide a cost effective remedy;
- State acceptance (FDEP);
- Community acceptance.

The primary objective as stated in the ROD was to remediate COC's to drinking water standards. The drinking water standards used were the Maximum Containment Levels(MCLs) of the COC's. The MCLs for the COC's are listed in table 2, Performance Standards for BMIT.

B. Remedy Selection

General

Based upon the consideration of the requirements of CERCLA, the detailed analysis of alternatives presented and public and state comments, and the data collected in the RI Report, the EPA determined that active remediation was unnecessary for the soils at the site. Previous data collected from site investigations and the RI report indicated that natural attenuation of COC's in the groundwater was already occurring at BMIT. Historical data and modeling transport indicated a time frame of three years for the COC's to reach drinking water standards. With this in mind the EPA choose alternative 2, natural attenuation with groundwater monitoring to ensure that drinking water MCLs are achieved through natural attenuation. The selected remedy involved:

- Quarterly groundwater monitoring for one year with reports;
- Annual groundwater data review and monitoring frequency by the EPA for the remaining two years;Use of existing institutional controls to protect against possible exposure to COC's (IE. obtaining well permits from FDEP);
- Use of existing wells for GW monitoring (a total of 30 wells exist on and off site) to ensure natural attenuation was occurring;
- Site Security (locked gate with fenced in area).

C. Remedy Implementation

Based on the ROD, a Unilateral Administrative Order (UAO) was issued to BMI-Textron in October 1994, directing BMIT to implement the selected remedy. As a result G&M (contractor) submitted a Post ROD **Groundwater Monitoring Plan** for BMIT that served as the Remedial Action Plan and the Remedial Design. The plan was submitted, latter revised and approved by the EPA in March 1995. The plan required three years of groundwater monitoring as stated in the ROD to demonstrate that COC,s were naturally degrading over time and that there was no future threat to human health and the environment.

G&M also submitted to the EPA a **Sampling and Analysis Plan** and a **Health and Safety plan**.

The Groundwater Monitoring Plan selected eight of the thirty wells that existed on and off the BMIT site for use in GW monitoring. Four of these were selected for use as on-site compliance wells because they were located in the upper surficial aquifer layer in the areas of percolation ponds two and three (MW-3, MW-35, MW-36, MW-38). These were the areas where the RI sample data indicated that contaminant levels had exceeded the drinking water standards. In addition off site monitoring wells (MW-93-4, MW-93-6, MW-10A) were added to the GW plan to check for potential offsite migrating groundwater contamination. Monitoring Well (MW-37) was added to the plan because it is situated hydraulically cross-gradient from percolation pond two and most of the other wells. See Figure 3 for monitoring well locations.

Under the terms of the GW monitoring plan, all eight wells were to be sampled for fluoride, total cyanide, sodium and arsenic until the contaminant MCL levels were below standards for two consecutive sampling events. At that time sampling could discontinue at the wells for the contaminants which had reached drinking water standards, until all other MCL levels were reached at each well. At this point the site could be removed from NPL status.

The next section will describe the O&M procedures for the site.

Operation and Maintenance

The post-ROD operation and maintenance period for the BMIT site effectively started with the first GW Quarterly sampling event on April 13, 1995. Under the terms of the Groundwater Monitoring Plan, Quarterly sampling was to proceed for one year and then change to annual GW sampling. However, the Plan also contained provisions for more monitoring or changes in monitoring frequency if the EPA determined it was warranted. Since the first GW sampling event, BMIT has submitted to the EPA twelve Groundwater Monitoring Reports which serve as O&M reports. Monitoring reports were submitted for the quarterly sampling events in April, July, October 1995 and January, 1996. Semiannual reports were submitted for the periods July 1996 to January 1998. Subsequent reports were then submitted for October 1998, January 1999, January 2000 and April 2000. The next report is scheduled for the quarterly, July 2000, sampling event.

BMIT has retained the contractor, Arcadis, Geraghty & Miller (formerly Geraghty & Miller) to perform all operations and maintenance (including monitoring and reports) required for the upkeep of the GW wells. Other than that, the contractor is responsible for no other upkeep of the area. A locked fence surrounds the site, which effectively keeps out trespassers and deters vandalism.

Routine Groundwater Monitoring

Under the terms of the ROD UAO, BMIT is responsible for the operations and maintenance of the GW monitoring well network. Groundwater monitoring system

maintenance requirements consist of inspection of the monitoring wells each time samples are collected, and repair as needed.

During a review of several GW monitoring reports, several repairs and replacements were noted. The maintenance performed ranged from repair of MW casings to replacement of entire monitoring wells. For example, in the fourth Quarterly GW monitoring report in March 1996, the contractor recommended to the EPA that Monitoring Wells 35 and 38 be replaced due to previous construction and design deficiencies. It was believed that the deficiencies were causing high sedimentation levels in the wells, resulting in high turbidity levels. The next groundwater report in September 1996 (after a request to switch to semiannual reports was granted by the EPA) the first Semi-annual report indicated that MW's 35 and 38 were replaced in June. The work involved installation and development of the two new wells and abandonment of the previous wells. The work was done according to a revised work plan that was submitted to the EPA on June 10, 1996. As a result, turbidity levels were significantly reduced in MW-38 but only slightly in MW- 35 (Currently MW-35 is the only well BMIT is required to sample). Based on the review of available documentation, interviews with the site manager Mr. Bill Vogelsong and observations during the 5-Year Review site inspection, the O&M requirements for the groundwater well monitoring system are being performed satisfactorily.

O&M Cost Data.

The BMIT ROD estimated O&M costs associated with the selected remedial action at \$253,800. This included estimated annual O&M costs at \$79,200. The actual annual costs of O&M has changed as drinking water standards have been reached for each COC at each monitoring well. According to the contractor (Arcadis, Geraghty and Miller, Inc) the actual costs of O&M for the five-year period since the sampling began in April, 1995 is approximately \$50,000 which includes the costs of replacing two wells in 1998.

III. Summary of site visit and Findings

A. General

This five-year review consisted of the following activities:

- review of relevant documents (see Attachment A, Documents Reviewed);
- interviews with the EPA, and FDEP Project Managers,
- interviews with the BMIT Project Manager:
- site inspection of BMIT
- visit to local repository to check availability of public documents:
- preparation of the five year review report.

The completed report will be placed in the local repository. [Notice of its completion will be placed in the local newspaper, and local contacts will be notified by letter.]

B. Interviews

EPA Region IV Remedial project Manager, Ms. Pamela Scully,

Ms. Scully was interviewed on several occasions: during the May 1999 USACE visit to EPA and in a several subsequent phone conversations. Ms. Scully provided background information on the BMIT site, and information on ongoing site activities. Ms. Scully provided documentation, which was reviewed, for this report.

Florida Department of Environmental Protection, Remedial Project Manager, Ms. Judie Kean.

Ms. Kean was interviewed in April by phone conversation and provided relevant information on the background of the site and on FDEP's role in ongoing site activities.

BMIT Project Manager, Geraghty and Miller, Inc., Senior Scientist Mr. Bill Vogelsong.

Mr. Vogelsong was interviewed on several occasions: during the April 26, 2000 site visit, and during several subsequent phone conversations. During the site inspection, Mr. Vogelsong guided the tour of the site providing commentary on features of the site and surrounding area, sampling activities, and other background information. Much of what was learned from Mr. Vogelsong is included in the report including monitoring well repair and maintenance.

C. Site Inspection

General.

The five-year review site inspection for the BMIT site was held on April 26, 2000. The weather was warm with sunny skies. There were no wet spots noted on the site.

The following individuals were in attendance:

1. Bill Vogellsong, Geraghty and Miller, Senior Scientist, Project Manager
2. Glenn Olshefski, USARC, Fort Dix RDPW, Environmental Scientist

During the site inspection, the following features were inspected or observed: perimeter Fence, asphalt covers, on and off-site monitoring wells, as well as general site conditions.

Site Security.

The perimeter fence covers the entire site and individual shops and businesses have their own gates, which they secure, at the end of the day. The locks and gates observed appeared to be in good condition. There was no apparent damage due to vandalism and the perimeter fence appears to be adequate. A guard dog was also in the area.

Monitoring Wells.

The monitoring wells observed appeared to be easily assessable and in good condition. Off-site MW-10A was observed to be in good condition. The lock was in good shape and had no signs of corrosion. The onsite wells are below ground type with metal covers that are flush with the asphalt pavement. There was some drainage water in the recessed metal area around MW 35R but otherwise it appeared in good condition. Currently this is the only MW used for sampling. Because the onsite monitoring wells did not have any locking mechanisms, the only means of securing the wells is the locked perimeter fencing. When the gates are open the locks are unsecured. However, the wells have a protective hinged cover and a lid slides over the below ground monitoring well.

Other than being identified as monitoring wells, the on-site wells do not have any identification numbers on them. However, all of the on-site and off site wells are clearly marked on maps. The wells were easily located and identified with the maps. Because the BMIT site is waiting for NPL delisting all of the onsite wells will probably end up being abandoned and filled to FDEP specifications. There is another superfund site to the north across Newman Road (Trans-Circuits) which may need to use some of the off site wells for monitoring purposes. Therefore, some off-site wells may remain as they are after delisting.

Asphalt Cover.

The asphalt cover over former Percolation Pond two was observed to be in good condition with no cracks or in need of repair. The asphalt cover area of former Percolation Pond three could not be viewed in its entirety because of stored construction debris in the area. There was adequate vegetative cover over the area of former Percolation Pond one. The other areas of the site also appeared to be in good condition.

D. Review of Applicable or Relevant and Appropriate Requirements (ARARs)

An ARAR review was performed for the site in accordance with the draft EPA guidance document, "Comprehensive Five-Year Review Guidance," EPA 540R-98-050, April 1999. The ARARS for the selected remedy are reviewed below.

Documents reviewed for the ARAR analysis:

1. Record of Decision, August 1994
2. Groundwater Monitoring Report, January 2000 (Geraghty & Miller)

ARARs Identified in the ROD Requiring Review:

1. 40 CFR 141.11-141.18 Safe Drinking Water Act Maximum Containment levels.
2. 33 USC 1251 Clean Water Act: Section 303- water quality standards including State water quality standards, and Section 304- Federal water quality 40 CFR Part 264.99 Compliance Monitoring Program.
3. FAC Chapter 17-3, and 17-550 Florida drinking water standards and monitoring frequencies for contaminants in groundwater.
4. FAC Rule 17-520 Groundwater classes, standards, and exemptions regarding groundwater classification and criteria for discharge to groundwater.

Groundwater Related ARAR Review: The ROD identifies all four of the ARARS for the selected remedy as groundwater specific ARARS. During the RD process, a groundwater monitoring program was developed and approved by EPA, which includes a specific list of parameters for analysis for the BMIT. GW monitoring has and is being conducted in accordance to the GW ARAR for the site. The groundwater at the site is considered a Class II groundwater. Exceedances of GW MCLs for the BMIT site are discussed in Paragraph "E" below.

General ARAR Related Protectiveness Summary: Although groundwater MCLs have been exceeded at several locations at the BMIT site, there does not appear to be an immediate threat to the protectiveness of the remedy. Groundwater usage restrictions and supply of city water to the business in the BMIT site have addressed the risks associated with the groundwater ingestion pathway. Currently, only one well on the BMIT site is being monitored for cyanide. Sampling data from the last two events (January and April 2000) have met the drinking water standards for amenable cyanide. According to correspondence reviewed, at least one more sampling event is recommended to demonstrate that stable concentration levels of cyanide and fluoride remain, before the EPA and FDEP can consider the site for NPL delisting.

E. Groundwater Data Review

Since the beginning of the O&M period in April 1995 to the submittal of the last O&M report for the April 2000 sampling event, sampling data in the GW monitoring reports have demonstrated that natural attenuation of the COC's has occurred as intended with the EPA's remedial selection at BMIT. However, it has taken longer than anticipated for total and amenable cyanide levels to reach drinking water standards. The following is a summary of BMIT groundwater monitoring reports and EPA and FDEP correspondences that were reviewed for this section. Please refer to Attachments B, C, D and E for summaries of concentration levels for the contaminants.

Between April 1995 and March 1996, cyanide and fluoride levels had exceeded the drinking water standards in several wells. MW-35 and MW-38 were above the standard for cyanide in all sample rounds. MW-3 and MW-36A were above the standard for fluoride in some rounds while MW-35 was above the standards in all rounds. Arsenic was detected in one round of sampling at MW-35 to be slightly above standards and sodium was also detected in MW-35 to be slightly above standards.

The March 1996 report suggested that monitoring for arsenic should be discontinued at the site because concentrations were below the drinking water standards for the past two quarters. The report also suggested that monitoring for sodium be discontinued in all wells except MW-35R which was the only well currently above drinking water standards. Based on the sampling data contained in the reports, the EPA and FDEP approved the recommendations and the monitoring plan was modified to incorporate the changes. The sampling events were also changed to semiannual intervals.

Sampling Data from the Fourth Semi Annual Sampling event in January 1998, confirmed that sodium levels in MW-35R were meeting drinking water standards because three of the four sampling events were below MCL levels. The sampling data in the report also demonstrated that of the eight wells being monitored for fluoride and total/amenable cyanide, only one (MW-35R) continued to exceed the cleanup goals. The contractor suggested in the report that monitoring for sodium should be discontinued at MW- 35R and to discontinue fluoride and cyanide monitoring at all wells except MW-35R.

The EPA and FDEP concurred to discontinue sodium sampling in MW-35R and to discontinue monitoring for Fluoride and Cyanide at all eight wells except MW-35. In June 1998 the FDEP also recommended that MW 35R be redeveloped and overpumped in an effort to bring the contaminants within acceptable ranges. The EPA concurred with the action in July 1998 and recommended sampling of the well one week after the overpumping event and three months later. The EPA also recommended that monitoring wells not used in the original monitoring plan, be properly abandoned according to FDEP regulations. However the wells used in the plan should remain in service (but not sampled) until NPL delisting.

In September 1998, the contractor (G&M) performed the overpumping operations at MW-35R and the abandonment of all wells as requested by the EPA in accordance to FDEP regulations. Approximately 1500 gallons of water was removed from the well which was properly disposed and manifested to the City of Palm Beach publicly owned treatment works. The well was sampled two weeks later in October 1998, with the sampling data showing mixed results. Although fluoride levels had decreased to meet drinking water standards, the total cyanide concentrations had increased in the monitoring well. In December 1998, a report was submitted by BMIT to both the agencies detailing the work that was performed at MW-35R.

In accordance with the EPA recommendations the contractor resampled the well in January 1999 and a monitoring report was submitted to EPA and FDEP. Sampling data showed that fluoride was in compliance of drinking water standards for the second round of sampling and cyanide levels had again continued to exceed the cleanup goals. Both agencies recommended that sampling of fluoride should continue for one more round to ensure that concentration levels were stable and before sampling could be discontinued. EPA and FDEP also recommended annual sampling of total and amenable cyanide until cleanup goals are met, followed by two quarterly sampling events to ensure that the concentration levels of cyanide in the groundwater is stable.

The next annual sampling event occurred in January 2000, and the sampling results demonstrated that cyanide levels (both total and amenable) were below drinking water standards. However, fluoride was not sampled as recommended by both agencies. Apparently, the contractor felt it was unnecessary due to the original sampling specifications in the ROD Groundwater Monitoring Plan, which stated that sampling of COC's would discontinue after two clean sampling events. The contractor for the BMIT site then changed to quarterly sampling frequencies as recommended by the EPA. Sample data from the quarterly April 2000 sampling event were below the drinking water standards for amenable cyanide and slightly above for total cyanide (See Attachment C). The contractor has since sent a request to the EPA for site delisting from the NPL.

VI. Assessment

The following conclusions support the determination that the remedy at the BMIT site currently remains protective of human health and the environment:

Effectiveness of Remedy:

As noted above, the asphalt cover over former Percolation Pond 1 is in good condition with no signs of cracks or need of repair. The condition of the asphalt cover over former Percolation Pond 3 can not be made until debris is removed from the area. There appears to be adequate asphalt cover over the rest of the site. The site drainage is relatively unimpeded (except for construction debris piles in the southeastern area of

the site) to drain in swales offsite as noted in the RI. Monitoring wells are in good condition and functioning adequately. Perimeter fencing appears to be adequate. The selected remedy remains protective of human health and the environment for the BMIT site. Sampling data from groundwater monitoring reports as discussed in section E, have demonstrated that natural attenuation of COC's has occurred. These conditions appear to indicate that the remedial actions continue to be effective. However according to EPA and FDEP correspondence reviewed, quarterly GW monitoring at MW- 35R, may need to be performed at least one more time to demonstrate that cyanide levels remain at stable concentration levels and continue to meet Federal and State drinking water standards. BMIT may also need another round of fluoride sampling as directed by the EPA and FDEP in a May 1999, correspondence to demonstrate that the concentration levels remain stable and are still meeting standards. This fluoride sampling was not performed in the January 2000, sampling event for reasons stated in section E. However, the issue of further sampling events is currently up to the discretion of EPA and FDEP. If the next quarterly sampling results demonstrate that cyanide drinking water standards are being met, then the EPA and the FDEP may consider removing the site from the NPL list. Because the rest of the site is considered clean, the EPA has currently requested concurrence from the FDEP for a partial deletion of the BMIT site from the NPL. (See Attachment F)

Adequacy of O&M: O&M procedures are consistent with requirements. No significant difficulties have occurred to date.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. O&M costs and maintenance activities have been consistent with expectations.

VII. Deficiencies

No significant deficiencies were noted that pose a threat to human health or the environment at this time.

- A. Onsite monitoring wells should have a means of securing the wells with a lock until the site is delisted and the wells are properly abandoned according to FDEP specifications.
- B. All monitoring wells that are not currently abandoned should have ID markings.
- C. According to EPA and FDEP correspondence, at least one more round of groundwater sampling of fluoride and total/amenable cyanide was recommended at MW-35R to demonstrate that concentration levels are still stable and meeting the drinking water standards. Currently this fluoride sampling event has not been performed as recommended.

III. Recommendations

The following recommendations are made to address the deficiencies noted above:

- A. Install locks on all monitoring wells that are not currently abandoned.
- B. Install ID markings on all monitoring wells that are not currently abandoned.
- C. Sample MW-35R for fluoride and total/amenable cyanide on the next quarterly sampling event and present the results in a monitoring report for EPA and FDEP review and analysis.
- D. Before NPL site delisting, the construction debris over former Percolation Pond 3 should be removed so the asphalt cover can be inspected to determine the condition of the area. If any repairs are needed they should be made before delisting the site.
- E. There were no EPA documents for the BMIT site available for review in the information depository at Lake Park Library, located at 529 Park Avenue, Lake Park, FL. According to library personnel, in March 2000, the documents were damaged by water from a leaking roof and were later disposed of in the trash. All EPA public documents related to the site should be copied and replaced in the depository for public review.

IX. Protectiveness Statement

The remedies at the BMIT Site remain protective of human health and the environment, at present. However, the EPA and FDEP may consider if further groundwater sampling and analysis of MW-35R for total / amenable cyanide and Fluoride is necessary before NPL delisting can take place.

X. Next Review

EPA policy requires ongoing five-year reviews of sites such as BMIT until NPL delisting takes place. If the site is not delisted from the NPL, then EPA should conduct the next review within five years of the due date of the first five-year review report, which is listed on the signature cover of this report.